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THESIS

SUGGESTIONS FOR DEVELOPMENT OF COMPUTERIZED PRODUCTIVITY MEASUREMENT IN MILITARY OUTPATIENT CLINICS

by

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Suggestions for Development of Computerized Productivity Measurement in Military Outpatient Clinics

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ABSTRACT

A method to measure productivity in military outpatient clinics does not exist. Present methodologies are too broad in scope to assess these clinics successfully. A methodology is proposed to measure output by using an indicator based on six weighted components of output measure. These components were derived from the literature concerning productivity measurement, from existing methodologies, and from the author's personal experience.

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I. INTRODUCTION

Prior to discussing measurement of productivity in military outpatient clinics and its relationship to that clinic's efficient supervision, it is necessary to discuss an aspect of human nature.

It is generally accepted that demand increases to exceed supply, especially in health care settings. In this context, demand represents a clinic supervisor's requests for resources and supply represents Top Management's response in the allocation of resources.

Instead of taking the viewpoint that a clinic supervisor is "greedy," it is more plausible to assume that he is merely reacting in a rational manner to the inevitable fact that resources are scarce. Faced with this scarcity and wishing to accomplish his mission, a reasonably conscientious clinic supervisor will assume that his clinic's workload will only increase in the coming years, and will adjust his demand for resources accordingly. Having made an "educated guess" of his future workload, he will tend to request resources in excess of that which is anticipated.

If a suitable forecasting model were available, the clinic supervisor would not need to resort to this strategem. His demands for resources would tend to match the anticipated needs for resources.

Accurately predicting the future is impossible, but "describing the present" is possible, and is necessary in order to make a reasonably educated estimate of the future.

Describing the present is the main drive toward the need for a productivity measurement tool.

It is worthwhile to apply this desire for a suitable productivity measure towards humanistic values. If the measure is obtained, clinic supervision will be improved. This will lead to a greater quality of patient care offered at a more economical cost to the recipient of the clinic's services.

Productivity may be defined simplistically as the ratio of "output" to "input". It should not merely measure output produced, however, but rather how well resources are combined and used to accomplish specific results:

$$\text{Productivity} = \frac{\text{results achieved}}{\text{resources utilized}} .$$

Both "results" and "resources" can be very complex items; superficially simple, they will have numerous factors influencing them [Ref. 1].

Defining inputs and outputs for our application is now appropriate. Suitable inputs for an outpatient clinic are costs per specific time period, numbers of staff personnel, or floor space occupied.

Traditionally, the sole output measure for an outpatient clinic has been the "Visit," defined as one patient encountering one physician at a single clinic. This author asserts that this concept is too restrictive, and will expand upon the definition of outputs in later chapters.

The approach to the goal of obtaining a suitable productivity measure will be as follows: First, the pertinent literature will be reviewed, followed by an examination of existing methodologies. If the goal is not then attained, this author will suggest a methodology to establish a productivity measure that will incorporate facts obtained from the research.

Our ultimate goal is to suggest a device to measure productivity, thus allowing greater efficiency of supervision in military outpatient clinics. This often results in a greater quality of care afforded to patients at the lowest practicable cost.

The next chapter will review and analyze the pertient literature. Chapter III will examine existing methodologies, while Chapter IV proposes a new method of output measurement. Chapter V suggests specific components of output measure, and Chapter VI is a summary.

II. LITERATURE REVIEW

The goal of this thesis is to move towards the development of an accurate methodology to measure organizational productivity in military outpatient clinics. In pursuit of this goal, one must review the pertinent literature to identify the extent to which this specific topic, or similar topics, has been considered, and to incorporate the lessons learned from such studies.

In this first section, we consider representative studies from that portion of the literature dealing with productivity measurement in outpatient health care settings. Our purpose is to review their content and to evaluate their measurement of productivity.

Mendenhall, Repicky, and Neville [Ref. 2] in 1980 employed a national study to assess the utilization and productivity of nurse practitioners and physician assistants in primary care settings. Using a vector of seven variables of output, namely number of patient encounters, time spent in encounters, time spent in patient contacts, telephone encounters, time spent in telephone encounters, dollar income generated per day, and dollar income generated per patient encounter, they determined that physician assistants were more productive than nurse practitioners. Their concept of using multiple output parameters will be incorporated in this thesis.

Dennis [Ref. 3] conducted a comprehensive study concerned specifically with nurse practitioners' productivity. He defined nursing productivity as it relates solely to nurse practitioners, and discovered that the nurse practitioner is an unusually valuable resource. He also suggested guidelines for increasing productivity, such as role definition, child care centers, unit dose medication, and computerized nursing care plans. He found that there was a lack of objective, proven, discriminating outcome measures, and an inability of outcome measures to identify their source agents. This reinforces the importance of this thesis' attempts to suggest such outcome measures.

Alexander, Weisman, and Chase [Ref. 4] utilized three outcomes (i.e., three productivity measures): nurses' job satisfaction, absenteeism rates, and resignation rates in their comparisons of primary nursing units with non-primary nursing units. They found that primary nursing units have lower resignation and absenteeism rates. Since this thesis' purpose is to suggest productivity measurement to compare separate work centers, Alexander's work [Ref. 4] reinforces the concept of using multiple outcomes to accomplish these comparisons.

Measurement of productivity can be estimated as a quotient, where the numerator is output (e.g., Occupied Bed - Days or Hospital Discharges), and the denominator

is input (e.g., Numbers of Staff or Annual Costs). Having reviewed representative literature dealing with productivity, we now consider the literature dealing solely with output.

Our goal is to examine the derivations and the definitions of the specific output measures, and to study the ways in which they are treated.

Thomas, et.al. [Ref. 5] used an approach for classifying one hundred and sixty-two Veterans' Administration hospitals into ten groups by using output-related characteristics as opposed to the traditional input characteristics. They took twelve direct measures of output (such as case-mix-adjusted discharges, outpatient visits, number of medical house staff, and research funding) and weighted these according to the hospital's view of each measure's contribution to the operating budget. The resulting summations were used to parition the one hundred and sixty-two hospitals into isoefficiency groups.

Thomas' [Ref. 5] use of multiple output measures, of weighting, and of regression analysis in assigning weights, provided conceptual guidance in this thesis. Our methodology is much the same except that, while Thomas [Ref. 5] views an entire hospital as his focus, we deal with only single outpatient clinics.

Cavaiola and Young [Ref. 6] approached patient classification and associated nurse staffing requirements by quantifying and clustering patient care needs (e.g., Mobility

Level, Bathing, Toileting, and Chronic Respiratory Disease). They, too, used regression techniques in grouping these assessment indicators, and were able to classify patients by the various levels of care required. This permitted a presentation of alternative nurse staffing strategies (e.g., Chronic, Skilled Nursing Care, or Intermediate).

Cavaiola [Ref. 6] advocated combining multiple outputs into single values. This guidance was followed in developing this thesis' methodology.

Previous sections have dealt with the representative literature as it pertains to productivity measurement in outpatient clinics and to output measurement in hospital environments. Next we review the literature that relates to a single, representative output, that of patient satisfaction.

In this author's experience, much of nursing training in recent years has incorporated the importance of a patient's mental well-being and its positive relationship to that patient's physical health. Further, patient satisfaction addresses the quality dimension of patient care, which is less easily-defined and more difficult to quantify than most measures.

Fletcher, et.al. [Ref. 7] conducted questionnaire-centered research among two hundred and twenty-five medical clinic patients to ascertain their priorities among eight attributes of medical care (i.e., continuity, coordination, comprehensiveness, availability, convenience, cost,

expertise, and compassion). Continuity of care, here defined as a patient seeing the same practitioner repeatedly, was given the highest priority, while cost and convenience were lowest. Since this thesis will discuss which specific output measures should be included in a productivity measurement algorithm, continuity of care will be included in order to attempt to capture at least a portion of the patient's assessment of worthwhile "output" by the clinic staff.

In 1977, Harris and Whipple [Ref. 8] noted a possible lack of responsiveness by Navy Health Care Systems to the patient as a "whole" person, with a resulting decrease in patient satisfaction. This resulted from a lack of information with regard to needs, expectations and evaluations of the patients. They studied four ambulatory care clinics, using questionnaires, and correlated patients' expectations with the clinic staff's predictions of patient expectations. Their findings showed an increasing prediction inaccuracy as information became more detailed. This further strengthens the case for the inclusion of patient satisfaction in this thesis' productivity measure.

Finally, representative selections of the literature dealing solely with health care systems' staffing will be reviewed. Our purpose is to determine whether productivity measurement has been incorporated into the staff scheduling process, and to glean lessons from successes.

Rothstein [Ref. 9] presented a systematic method of allocating manpower to support rotating shifts, using mathematical programming. From his opening assumptions, he stated that the number of personnel required "... has been determined by ... some appropriate technique such as work measurement" [Ref. 10]. This reinforces the credibility of using productivity measurement toward an ultimate goal of determining staffing requirements.

In 1978, Burns [Ref. 11] mathematically calculated the minimum number of staff required to support a seven-day-a-week operation, subject to various labor constraints (e.g., maximum consecutive days worked, maximum number of days worked in a specific time period, and alternating weekends off). While Burns' [Ref. 11] work is useful in determining staff levels subject to labor constraints, this thesis will go further. It will address staff levels determined by productivity measurement, as well as governed by labor constraints.

In 1972, Liebman, Young, and Bellmore [Ref. 12] proposed a mathematical model to generate daily task assignments on nursing care units. One of its basic premises was nursing team leaders' subjective measurement of their personnel's effective use. This model incorporates a subjective, judgmental productivity measure, while this thesis will propose an objective productivity measure.

Smith [Ref. 13] developed a computer-generated interactive algorithm to schedule personnel on acceptable cyclical rotational schedules. While he does not consider productivity measurement in determining staff levels, his work is valuable in that he successfully automated a previously totally-manual operation.

In summary, while valuable lessons have been learned from a representative review of the pertinent literature, our goal of discovering a satisfactory productivity measurement tool for military outpatient clinics has not been realized.

The literature speaks of techniques for measuring productivity and for determining output, but none is narrow enough to focus specifically upon military outpatient clinics. Staffing techniques were addressed in detail, but none of the representative literature incorporates productivity measurement in the determination of staffing levels. The literature has not explored the concept as deeply as this thesis proposes to do.

III. EXAMINING THE EXISTING METHODOLOGIES

Any discussion of the pertinent literature contains information in both the scholarly and theoretical situations. That is, not only is there an academic discussion, but principles and rules are given, which are readily adaptable to real-life situations. Thus, the literature search becomes valuable not only from an academic viewpoint, but also in providing guidance for the achievement of specific goals.

The next step is to consider existing programs related to measuring productivity in outpatient clinics and determine to what extent they might satisfy our goals. The utility of such existing programs will be evaluated from the viewpoint of the literature reviewed. The three methodologies examined are the Uniform Chart of Accounts (UCA), the Uniform Staffing Methodology (USM), and the Navy Occupational Task Analysis Program (NOTAP).

While there are substantial differences among the three methodologies to be discussed, they have some common ground. All relate to resource requirements, all are intended for use by the military establishment, and all are designed to collect and categorize information.

The USM differs from the UCA in that the former considers staff per unit of output, while the UCA considers

cost per unit of output. NOTAP considers definitions of job-related tasks and relates these to workload (that is, to input).

The UCA was created because of various difficulties noted in the data collection of cost reporting in the military health care delivery systems. It was noted that separate information systems and data bases were being maintained, that there were differing interpretations of definitions, and that different inputs existed that gave divergent outputs [Ref. 14]. Therefore, given these difficulties, it became apparent that a valid comparison of cost data among fixed military medical and dental facilities in the U.S. could not be made.

The UCA could be valuable in providing guidance to measure productivity in outpatient clinics in that its purpose is to measure efficiency in medical facilities using cost data.

In 1975, a Department of Defense, Department of Health, Education and Welfare, and Office of Management and Budget study gave impetus to the creation of the UCA in order to alleviate these difficulties. A tri-service working group was formed in July 1976 to develop a uniform cost reporting system and the UCA was implemented at ten test sites on 1 October 1978. The UCA was implemented DoD-wide on 1 October 1979.

The UCA was to provide consistent rules for expense and performance accounting and reporting by DoD in military medical facilities [Ref. 15]. UCA today is a cost accounting system that identifies the total cost of DoD fixed medical treatment facilities, breaks these costs down, and assigns them to final operating expense accounts [Ref. 16].

The UCA is pertinent to our goals in that it uses multiple output measures, weighting of these measures, and regression analysis in this weighting. It alone cannot be used to accomplish our goals, as its focus is too broad; it cannot sufficiently measure productivity in a single military outpatient clinic. Further, it provides little guidance as to which output measures to employ when examining individual outpatient clinics.

The origins of the USM date back to 1974 and 1976, when the House Appropriations Committee recommended that DoD develop uniform standards for use in determining medical manpower requirements to compare fixed military medical and dental facilities [Ref. 17].

In 1976, the Office of the Assistant Secretary of Defense for Health Affairs (OASD(HA)) developed an improvement of the existing USAF system of programming medical manpower requirements. Building upon this USAF system, the project expanded to develop the USM across all three services' medical departments.

In September 1977, OASD(HA) developed a working paper, and in 1978, a working group was formed to begin development of a uniform methodology. Because the UCA broke down medical facilities into specific work centers, it was decided to view staffing in the same work centers. Thus, the decision was made to align the USM with the UCA.

The UCM is only now, in recent months, in its final implementation stage.

The USM's goal is to develop a uniform method for determining and justifying DoD medical manpower requirements. That is, it will establish a common methodology rather than common standards, and will make manpower determination more efficient and compatible across the military services [Ref. 18].

The USM defines manpower work centers aligned with hospital functions based on UCA work centers. It obtains data on the number of hours worked, by the kind of personnel (e.g., military doctors, civilian DoD doctors, enlisted technicians, etc.) per work center. This data is collected at local fixed medical facility level, and is forwarded to major command level for examination.

The USM is manual at the work center level, and batch processing is used at each fixed medical facility level to tabulate reported data. The Office of the Assistant Secretary of Defense for Manpower, Reserve Affairs and

Logistics provides manpower management policy to DoD components upon examination of the USM data.

The USM is valuable for the purpose of this thesis in that it uses multiple output values, weighting, and regression analysis in determining the weights. However, it, like the UCA, cannot focus solely on an outpatient clinic for measurement of productivity. It also disavows the development of staffing standards [Ref. 19], while this thesis seeks guidance for setting standards.

The USM's sole output measure for its examination of outpatient clinics is the "Visit." While the USM uses multiple output measures in its examination of fixed medical facilities, it provides no guidance regarding which multiple measures to use in measuring an outpatient clinic's productivity.

NOTAP, a program administered by the Navy Occupational Development and Analysis Center (NODAC), Bureau of Naval Personnel, consists of job analyses of all Navy Ratings to assess the required rating structure. It utilizes a structured questionnaire to subjectively determine job content. Its key data are the percentages of Navy personnel performing pre-designated tasks. It can be useful here in that it addresses outpatient clinics directly, and refers to specific tasks performed there [Ref. 20]. However, it was never designed to measure productivity, nor can it be used to make any qualitative judgments [Refs. 21 and 22].

A link exists from NOTAP to SHORESTAMPS, the Navy's program to develop staffing standards by billets. The task data discovered by NOTAP are judgmentally linked to a particular rating, and SHORESTAMPS is tasked with determining billet requirements. This is potentially useful for the present purposes in that it specifically assigns numbers of personnel to specific work centers. But SHORESTAMPS considers workload, that is, input, in its regression analysis [Ref. 23]. However, this thesis, with the guidance gleaned from the literature review, will measure productivity using only output measures.

For the stated reasons, none of the discussed methodologies are totally satisfactory for measuring productivity in military medical outpatient clinics. While they provide guidance in light of the literature review, they are all too broad in their scope, and unable to be sufficiently focused to accomplish our goal. Further, the discussed methodologies are poorly understood and interpreted by the personnel supplying data. The data are therefore suspect [Ref. 24].

Given the failure of the existing methodologies to completely satisfy our goals, and given the guidance provided by the literature search, this thesis proposes an alternative method to measure productivity in military outpatient clinics, having the following characteristics:

- The productivity measurement must examine only out-patient clinics in fixed military medical facilities.

- The output measures ultimately selected should be consistent with clinic supervisors' experience, and with the guidance provided by the literature review.

- The weighted output measures should be capable of aggregation so that one value corresponding to one clinic can be obtained.

- The productivity measures must be perceived as having the ability to eventually develop formal standards.

Since our goals have not been realized by the existing methodologies, the next chapters will give a broad overview of a suggested productivity measure incorporating the characteristics discussed, and will finally suggest the specific components to use in such a measure.

IV. OVERVIEW OF A SUGGESTED MEASURE

In previous chapters, it has been apparent that our desire to establish a productivity measure for outpatient clinics is largely subjective in nature. Defining productivity measures for inpatient care is more readily arrived at; outputs such as Occupied Bed-Days and Successful Surgeries may be utilized, and their measure of success directly reflects the subjective concern of quality.

In contrast, quality of care is a more difficult concept in the case of outpatient clinics. Diseases and injuries treated there are often chronic and recurrent. There are also fewer easily quantifiable successes in outpatient clinics that a productivity measure can capture.

It is not practical to measure productivity by subjective descriptions. It is necessary to use objective means; this implies that the important characteristics of the clinic's services must be "countable." (Here, "objective" may be defined as expressing facts without distortion from one's personal feelings or prejudices.)

Previous methodologies fell short in this quantitification process due to a lack of basic understanding, lack of a narrow and proper focus, and problems in interpretation. The most promising, the USM, was clumsy in its execution, and contains only one variable related to outpatient clinics.

This thesis proposes to define the "output," Y, of a military outpatient clinic in the form:

$$Y = \sum_{i=1}^{n} C_i X_i$$

where X_i is the total value of each component of the output measure, C_i is the weight assigned to each component, and n is the total number of components suggested.

To increase its flexibility, output measurement, rather than productivity measurement is utilized in the suggested formula. As discussed in Chapter II, productivity can be measured by dividing output by input. By not restricting the input to any one variable (e.g., number of staff, cost per unit time, amount of floor space), greater adaptability is attained.

As learned in the literature review, multiple components of output measure are more desirable than single components. If one component should prove to be weak or inferior, the remaining components will tend to minimize the inaccuracy. The problem of which specific components to include will be addressed in the next chapter.

The individual components of output measure cannot generally be considered to be of equal importance. A weighting scheme is suggested whereby the weight assigned each component would reflect the relative value or utility to an outpatient clinic.

One method of weighting is to examine the resource budget of the clinic in the past and assign a weight to each component that reflects the amount of resources previously committed to the measured activity.

A regression-based statistical cost function would then identify implicit weights for output components by their relative resource consumption. The clinic's operating budget (or its numbers of staff, or its square footage of space, etc.) would be the dependent variable, and the component measures would be viewed as independent variables.

A least-squares regression analysis would yield a coefficient for each output component that reflected its utility to the outpatient clinic.

The derivation of the weighting scheme is impractical for manual operation. The gathering of historical data, combined with the actual regression analysis, would not be efficient in terms of time.

Fortunately, computer software exists, able to function on mainframe computers, on microcomputers, and even on hand-held calculators, that can successfully execute regression analyses.

Further, an appropriate computer can perform the actual summation of the weighted components for numerous clinics much more readily than a human operator.

In addition to the advantages gained in time-saving and in reduction in operator error by using automated data

processing, other advantages arise, depending on whether microcomputers or mainframe computers are used.

If microcomputers are employed, each clinic supervisor possessing one would be able to track his clinic's productivity continuously. Statistical analysis software packages could be used to suggest beneficial adjustment of the components of output measure by the clinic supervisor.

If mainframe computers are used, the data base for all clinics comprising the hospital would be available for Command personnel to utilize in performing decision-making analyses. Further, if telecommunications are employed, reports of each individual clinic's performance would be available to national medical supervisory personnel as often as each clinic updated its record.

The result is a numerical, distilled value that incorporates all the chosen components of output measure. It would also be possible to break down the total output into each of its components in order to examine any one component more closely.

After the productivity measures had been tracked for some specific time period, it is possible to establish standards. Then, the problem of recognizing a good clinic versus a marginal clinic versus a poor clinic could be addressed, and mangement action could be taken, if appropriate.

V. WEIGHTED COMPONENTS OF MEASURING OUTPATIENT CLINICS

Since multiple, rather than single, components of output measure will be used, and since weighting will increase accuracy, it only remains to discuss precisely which components should be included in the output equation. This author suggests six components of output measure: Some derived from personal experience, some modified from the literature search, and some extracted from existing methodologies.

The specific components are as follows:

- X_1 - Visits in which the patient sees a practitioner.
- X_2 - Visits in which the patient does not see a practitioner.

These are merely an extension of the commonly used "Patient-Visit" [Refs. 25 and 26]. The division was suggested by this author's experience in outpatient clinics. Different mechanisms are operating in each of the two components.

- X_3 - Number of Corpsmen Trainees.

This is a variation of Thomas' work [Ref. 27], tailored specifically to outpatient clinics and to military facilities.

- X_4 - Special Treatments.

This was considered by this author to be important in any form of measuring quality and quantity in outpatient clinics.

o X_5 - Patient Satisfaction.

This variable was suggested by Harris and Whipple [Ref. 28].

o X_6 - Continuity of Care.

This variable was suggested by Fletcher [Ref. 29].

The following sections define each of the suggested components, and discuss the means that could be employed to minimize manipulation of the numbers involved.

1. Visits in which the patient sees a practitioner.

Here, a "practitioner" may be defined as a person licensed to practice medicine, even if it is only in a limited or subordinate role. Thus, not only are M.D.'s and D.O.'s included, but also nurse practitioners and physician's assistants. Each visit by a single patient to a single practitioner would count as one.

In order to prevent manipulation of the number of visits, that is, to prevent an artifically high volume, it would be necessary to monitor the frequency of requests for rechecks. In the Doctor's Orders, along with orders for drugs and treatments, there is usually a demand to be rechecked in a specified period of time. Once the average of the recheck request frequencies has become apparent, any practitioner

who seeks to have his patients return more often will stand out. This may be evidence of manipulation, or there may be sound medical reasons, such as a tendency of some practitioners to handle only the most ill patients. Computerized procedures would be of value here. Unless automated, sifting through the numbers of recheck requests and comparing them with the established standard would be an impossible task.

2. Visits in which the patient does not see a practitioner.

This component would entail a visit to a clinic, either scheduled or unscheduled, where it is medically unnecessary to see a licensed practitioner (e.g., blood pressure checks, prescription refills, twenty-four-hour cast checks, or simple eye exams).

The question of manipulability probably would not be a problem with unscheduled visits, but there might be a definite problem if a clinic wanted to inflate its figure. To guard against "double-counting," only <u>one</u> visit per day would be allowed in the counting process. Further, it would be necessary to insure that the timing of scheduled rechecks is commensurate with the medical reasons requiring the repeat visit. To use treatment of hypertension as an example, consider that mild hypertension usually demands a blood pressure check roughly every month. If a person with

hypertension were scheduled for rechecks twice a week, this would be possible evidence of tampering with measurement data. Computerized procedures again would be of value in the "sorting and comparing" tasks.

3. Corpsmen Trainees.

It should be remembered that this thesis is designed for use by military (especially Navy) outpatient clinics. In these Navy clinics, Corpsmen comprise substantial numbers of the staff personnel. Since education can be considered a necessary part of medicine, the training of Corpsmen has value that should be included in the measurement of output.

All Corpsmen can be viewed as trainees, since the experience they gain and the tasks they accomplish are required to advance in rate. The component of output measure would be the number of Corpsmen in staff positions, if they could indeed be considered trainees. A manipulability guard would exist in that their service jackets would be examined to insure they were advancing in rate according to established military standards.

4. Special Treatments.

This variable would measure the provision of resource-intensive treatment and diagnostic procedures, over and above the routine and minor treatments which are the "raison d'etre" of an outpatient clinic's existence. This component could also be designated as Major Procedures. Examples might include echocardiograms, chemotheraphy, and application of complicated casts.

To insure against manipulation, a clinic would need clear definitions of what a Major Procedure was. Routine treatments and minor procedures such as immunizations and well-baby checks would not be construed as Major Procedures, since they would be too closely linked with X_1 and X_2 .

5. Patient Satisfaction

This variable would be quantified by administering a questionnaire to patients entering a clinic for either form of a "Visit." The questionnaire used by Harris and Whipple [Ref. 30] would be appropriate.

The value of this variable would depend on both the mean and the variance of the scores, so that component X_5 would not be linked too closely with components X_1 and X_2 .

To prevent manipulation, it is necessary to keep the dissemination policy firm and consistent (e.g., every fifth patient is issued a questionnaire) with no attempt to guide who does and who does not get a questionnaire.

6. Continuity of Care

This category also would involve a questionnaire given to patients. It would utilize direct patient response to see if the patients were encountering the same practitioner on consecutive visits. The value of this variable also would depend on the mean and the variance of the scores given on a graduated scale by the patients. This component might be

viewed as a subset of Patient Satisfaction, but this author considers it important enough to rate as a separate component.

The only manipulability possible here would be blatant falsehood, since it would be inherently necessary to maneuver schedules and appointments to increase Continuity of Care.

The specific estimation procedures and data will depend upon the level and purpose of the output (and hence, productivity) measurment. The result will be a single value for a single clinic.

How this value may be of use will be discussed in the final, summary chapter.

VI. SUMMARY

Management of today's military outpatient clinics involves the necessity of measuring productivity in outpatient clinics. This cannot be satisfactorily accommodated by existing productivity methodologies. The representative literature provided guidance, but also did not satisfy the need.

Once arrived at, the output estimate proposed here may be divided by any selected input to obtain a single-valued productivity measure for a single outpatient clinic.

Comparisons may be made between similar clinics at different hospitals, and between different clinics at a single hospital. Trends may be followed by analyzing the values of the productivity measure over specified periods of time. If necessary, management action can then be recommended.

Applying weighted multiple components of output measure specifically to military outpatient clinics is a new application. However, the concepts of using weighted multiple components and of using regression analysis to establish weights have ample precedent.

This author's suggestions for the specific components of output measure are intended to have motivational value only.

It is anticipated that readers will modify and enhance these proposals to make this suggested methodology more workable in a real-life situation.

Finally, the need for use of automatic data processing in all appropriate aspects of this proposed methodology cannot be over-emphasized. Without suitable computerization, the tasks are insurmountable.

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